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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •

JUNE 23, 1934

Young Warriors in Their Castle

See Page 396

A SCIENCE SERVICE PUBLICATION

SCIENCE NEWS LETTER

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The Weekly Summary of Current Science

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Edited by WATSON DAVIS

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DO YOU KNOW?

China is the largest producer of musk for the perfume trade.

An electric "tongue" has been devised which can be used to test the amount of acid in fruit juices.

A ball-bearing aerial train of Russian design is to be tried on an experimental line near Moscow.

A new method of processing maple sap gives about ten times as strong a maple flavor as the ordinary process.

It is reported that the "electric eye" device can be made to serve crippled children, so that a helpless patient can ring for a nurse or can turn the pages of a book merely by a nod of the head.

The addition of calcium chloride to ingredients used in concrete permitted the opening of a thoroughfare in Washington, D. C., to heavy traffic nine hours after the concrete had been placed.

Panama has begun this year to try raising enough rice to supply its own wants.

Tests have shown that three northern hardwoods, beech, birch, and maple, can be used to make high grade paper.

Chemical fertilizer manufacturers in the Irish Free State are producing a new manure from sugar beet factory waste.

A shark's tooth, probably a relic of a vast prehistoric sea, recently was found embedded in the sandstone of the Grand Canyon.

The Near East was the first place where petroleum was discovered but has been one of the last places to develop a petroleum industry.

A successful method of making vinegar permanently clear and bright may be applied to the clarification of other fruit products marketed in glass.

WITH THE SCIENCES THIS WEEK

AGRICULTURE

Why was a pest-eating toad kept out of Florida? p. 391. *Reptiles and Amphibians—Thomas Barbour—Houghton Mifflin,* 1926, $3.50.

ANTHROPOLOGY

What are the tools of those who try to salvage human bones from rock? p. 398.

ARCHAEOLOGY

What was the most sumptuous city in the world in the tenth century? p. 392.

ASTRONOMY-PHYSICS

What happens when a star blows up? p. 390.

AVIATION

What causes an airplane propeller to break? p. 392.

CHEMISTRY

Why does nitrogen give force to an explosive? p. 390.

ENGINEERING

Where is the most beautiful small bridge built during 1933? p. 387.

ENTOMOLOGY

Where does the chinch bug spend the winter? p. 388. *The Insect Menace—L. O. Howard—Century,* 1931, $3.50.

ETHNOLOGY

How can a song be photographed? p. 393.

GENERAL SCIENCE

How many members has the Science Advisory Board? p. 393.

MEDICINE

How can a support aid in the treatment of gastric ulcer? p. 392.

How does timothy aid the hay fever victim? p. 393.

What care should be observed in administering oil to infants? p. 387.

What causes prolific growth of cells in a mother before the birth of her child? p. 396.

What cheap food prevents pellagra? p. 394.

What effect has vitamin A on colds? p. 393.

What serves as a barrier in the body to the spread of cancer cells? p. 389.

When is hay fever at its height? p. 389. *Asthma, Hay Fever and Related Disorders—Samuel M. Feinberg—Lea and Febiger,* 1934, $1.50.

METEOROLOGY

Why are the most frequently tried methods of rain making impractical? p. 397. *Plant Ecology—J. E. Weaver and F. E. Clements—McGraw-Hill,* 1929, $5.

PHYSICS

How can phosphorus be made non-inflammable? p. 399.

How do chemical tests prove radioactivity? p. 387.

PHYSIOLOGY

What is the Zondek-Ascheim test? p. 393.

What is there in tobacco besides nicotine that harms some people? p. 392.

PSYCHIATRY

What mental disease had Shakespeare's Timon of Athens? p. 398.

PUBLIC HEALTH

What county is suffering most from infantile paralysis? p. 388.

SEISMOLOGY

Where are the Kurile Islands? p. 392.

These curiosity-arousing questions show at a glance the wide field of scientific activity from which this week's news comes. Book references in italic type are not sources of information for the article, but the references for further reading. Books cited can be supplied by Book Department, Science News Letter, at publishers' prices, prepaid in the United States.

PHYSICS

New Element is "Relative" Of Brittle Metal Manganese

Fermi Reveals Metal Salts Added to Uranium Removed Radioactivity, Producing Precipitate of No. 93

THE HEAVIEST element known to science—No. 93—is a substance whose properties make it a chemical relative of the hard, brittle metal manganese. A description of the nature of the new element together with proof of its existence has appeared in the British science journal, *Nature,* over the signature of its discoverer, Prof. Enrico Fermi of the Royal University, Rome.

Since the first announcement of the discovery by the veteran scientist Senator Mario Corbino before the Lincei Academy in Rome, scientists of the world have waited eagerly for the published report of brilliant, young Prof. Fermi.

In describing his research which added another element to the 92 already known to science, Prof. Fermi declared that the crucial test was to add salts of the metal manganese to a solution of uranium after the latter had been bombarded with neutrons. Uranium is the dense "mother" element which breaks down by radioactive disintegration to produce a variety of lighter elements including radium.

Following the addition of manganese salts to the uranium fluid, a cloudy precipitate formed in the vessel and fell to the bottom. Most of the radioactivity floated down with this precipitate, indicating that a disintegrating substance, other than uranium, was present. The precipitate was a chemical salt of the new element No. 93.

The addition of salts of other elements—uranium, lead and barium—while forming precipitates in some cases did not remove the radioactivity from the uranium mixture.

This precipitation test, Prof. Fermi indicates, shows that element No. 93 probably is a heavy-weight relative, or homologue, of manganese. The experiment is not quite conclusive, however, in the sense that the yet-unfound elements 94 and 95 may have been present in the tell-tale precipitate, he added.

The use of chemical tests to prove radioactivity is not new. In the epoch-making experiments of Irene Curie and her husband, F. Joliot, last January, in which science for the first time produced artificial radioactivity, the French scientists shot the cores of helium atoms at boron nitride. By heating the boron nitride target in caustic soda, ammonia gas was formed. The radioactivity present then separated from the boron compound and was carried away as a gas with the ammonia vapor. The active substance in the ammonia, said the Joliots, was a form of nitrogen gas breaking down spontaneously by radioactive distintegration. Prof. Fermi, in a comparable test, finds the radioactivity going off with the precipitate.

Science News Letter, June 23, 1934

MEDICINE

Babies Inhaling Oil May Get Pneumonia

PNEUMONIA may occasionally result from accidentally drawing oil into the lungs, Dr. Kano Ikeda, of Saint Paul, told members of the American Society of Clinical Pathologists.

Such cases are not as rare as generally believed and are especially apt to occur among weakened infants who are almost always artificially fed and prone to infection of the upper part of the breathing tract, Dr. Ikeda pointed out.

Cod liver oil, haliver oil and the like are often prescribed for such infants and often forcibly fed, and nasal oil of one kind or another is instilled almost routinely during colds. A little of the oil may be accidentally drawn into the lungs and there cause changes associated with a certain type of pneumonia. Dr. Ikeda found seven such cases in examining microscopic sections from the lungs in 100 consecutive post mortem examinations of infants' bodies.

Other oils which may be accidentally aspirated are castor oil, olive oil, poppy seed oil which is used for diagnostic purposes, and cream and milk fat.

While this type of pneumonia is most apt to occur in frail babies, it may occur in older children or adults who from various causes have lost control of swallowing or of the reflex mechanism that, in the popular phrase, keeps things from going down the wrong way and being inhaled instead of swallowed.

The pneumonia which may occur in infants from accidentally getting oil into the lungs is relatively harmless in itself but may develop into a more serious condition. For this reason Dr. Ikeda warned that care should be exercised in giving oils, particularly to weakened babies.

Science News Letter, June 23, 1934

MOST BEAUTIFUL BRIDGE

One of the three most beautiful bridges built during 1933, as selected by the American Institute of Steel Construction. It is the "Dr. John D. McLoughlin Bridge" at Portland, Oregon, which won in class "C," for the smaller bridges. A stainless steel plaque will commemorate the award.

ENTOMOLOGY

One Million Dollars to Fight One Little Bug

Trench Fighting, With Chemical Warfare, Will Be Used to Check Advance of Chinch Bug Hordes

CHINCH bugs have been added to the Midwest's agricultural troubles of drought, dust storms, depression, erosion, grasshoppers, unpaid taxes, and a congressional campaign in the offing. The Corn Belt farmer must surely, by now, have a fellow-feeling with the country folk of Egypt, groaning under the Ten Plagues of Moses.

The chinch bug is no minor plague, either, when he gets going. For though the individual insect is tiny—not more than about a fifth of an inch long—there are such uncountable billions of him that the horde moves like a living carpet, ruining every green thing it comes upon.

Normally, there are always a certain number of chinch bugs in the warmer parts of the great midwestern and western grain belt. But in a year favoring their rapid multiplication—combining as a rule a mild preceding winter, a dry spring and a hot, droughty summer—they increase beyond all imagination, and the damage they do to crops can hardly be surpassed even by locusts.

The individual chinch bug might be rated as an interesting little insect to study under a magnifying glass, if the collective manners of the species were not so evil in the sight of men. The chinch bug is rather slender, with dark body and glistening white wings, each with a dark oval spot. Its second or specific Latin name, leucopterus, means "white-winged."

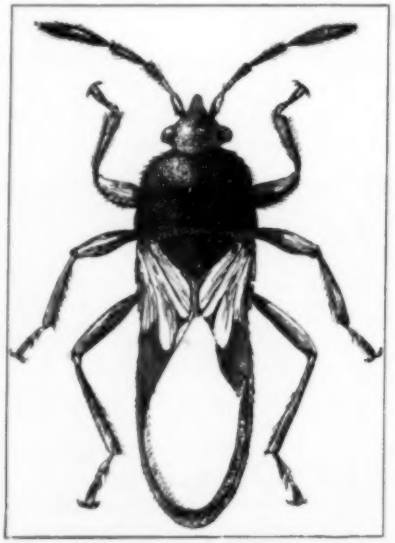
Truly a Bug

Entomologists who protest when you try to call any insect a bug do not mind the chinch bug's being so called. For he is a real bug, in the strict sense of the word. That is, the chinch bug belongs to the great group of insects with piercing, sucking beaks instead of chewing mouths like those of grasshoppers. Insects thus equipped are called Hemiptera by the learned, and are the true bugs. Other members of the bug order are squash bugs, box-elder bugs, stink bugs, giant water bugs—and bed bugs.

The chinch bug does its feeding—and thus all its mischief—with its sharp little beak. It sinks that beak into the stalk of a green plant and proceeds to draw sap, just as its notorious domestic relative draws blood. And when several thousand of them get busy on a cornstalk—well, just imagine how you yourself might feel.

The chinch bug overwinters in the shelter of weeds and stubble on the ground. That is why a mild winter is apt to precede a bad chinch bug summer. In the spring it produces its first batch of progeny. These get to work on the early small grain and forage crops.

When the small grains and hay have been cut, and dry summer has arrived, the bugs leave their first homes and migrate to the green cornfields, where there is still sweet sap to be sucked. They travel along the ground, a living sheet of avid tiny appetites. Cornfields wilt before their advance, quite literally in a few minutes.



THE LITTLE BAD CHINCH BUG

He is only about a fifth of an inch long, actually, but fighting him is going to cost Uncle Sam a million dollars this summer. That sum has been appropriated by Congress to aid in the endeavor to check the chinch bug depredations in the grainfields of the Midwest. As one of the 125 million citizens of this country, your share of this insect war-tax will be eight-tenths of one cent.

This is the stage that has now been reached throughout the corn belt—over most of Oklahoma, eastern Kansas and Nebraska, southern Iowa and the greater part of Missouri, all of Illinois, and southern Indiana. Here the Government's million dollars' worth of anti-bug munitions will be expended.

To check the advance of a chinch bug horde trench warfare is resorted to. Barrier ridges are plowed in its path. A strip of creosote is poured along their tops, and at intervals pits are sunk.

The bugs, repelled by the sticky, smelly creosote, run along the barriers and fall into the pits. There they can be killed with kerosene or by simply crushing them.

A chinch bug fight is no country-club tennis tournament; it is a dusty, dirty, messy business—a massacre in millions. But if the bugs succeed in breaking the line, it is the corn that gets massacred.

This summer, with the wheat crop so deeply cut by the drought, corn is precious and must not be lost.

Farmer and scientist, with spade and plow and creosote can, grimly face the enemy.

"They shall not pass."

Science News Letter, June 23, 1934

PUBLIC HEALTH

Infantile Paralysis Epidemic Still Growing

THE OUTBREAK of infantile paralysis, centering in California, is still growing. The latest figures, compiled by the U. S. Public Health Service, show 273 new cases in California for the week ending June 9. Cases reported throughout the rest of the country bring the week's total up to 294.

Steady advance of the outbreak has been marked through recent weeks, the new cases in the week of May 26 totaling 118, and in the week of June 2 totaling 178.

Los Angeles County and vicinity have been most seriously affected.

Public health officials are warning parents to keep children away from crowds where they may be exposed to the disease, and to watch for early symptoms when treatment is most effective.

Science News Letter, June 23, 1934

MEDICINE

More Amperes, Fewer Volts Seen For Cancer Treatment

Proposed X-Ray Apparatus Would Secure Much Greater Energy Without Necessity For Extremely High Potentials

HOPE for improvement in the treatment of cancer appeared in a report by Dr. Arthur C. Christie of Washington, D. C., to the American Medical Association.

Wider use of X-rays and improvements in X-ray apparatus seem to be the lines along which medical scientists will advance in their fight against this great disease enemy.

"The possibilities of radiation in the treatment of cancer have not yet been exhausted," Dr. Christie declared. "There are indications now that further advances may be made in Roentgen apparatus."

These advances, he explained, will be such as to secure a much greater energy output by the use of tremendously high milliamperage, rather than by increasing the voltage. Voltage in itself is of no importance, he asserted. The results in treating cancer by X-rays are due to the amount of radiant energy that can be turned onto the cancer without permanently injuring the normal tissues around it.

The machines of high milliamperage which Dr. Christie discussed would take less space than the very high voltage machines now being used in a few cancer clinics. They would give the same results by enabling the operator to give the treatment at much greater distances from the patient, thus securing the proper relation between the surface and the depth of dosage.

Dr. Christie pointed out the benefits of radiation treatment as compared with surgical treatment of cancer, and emphasized that best results are obtained by both X-rays and surgery when cancer is treated in the early stages. He listed five additions to scientific knowledge in recent years which have improved the results in the fight against cancer.

First of these is perfection of the method of fractional X-ray dosage with high voltage over a long period of time.

Second he mentioned the better understanding of both the role of the normal tissue surrounding a malignant growth and likewise of the necessity of securing the proper relation between destruction of cancer cells and reaction of the tissues surrounding the cancer.

Third on his list is the increasing knowledge of the value of giving X-ray treatment before operation on cancer patients.

Fourth is a better appreciation of the ever-constant danger of injuring a cancer, and of the fact that such danger can be lessened by preliminary irradiation.

Fifth is the fact that physicians have a better grasp of the role played by the small lymph nodes throughout the body and of the necessity of preserving these as nearly intact as possible as a barrier to the spread of cancer cells, and at the same time destroying cancer cells already lodged in the lymph nodes.

Science News Letter, June 23, 1934

MEDICINE

Hay Fever Victims Must Not Adopt Nudist Cult

HAY FEVER victims who "go nudist" are courting disaster. Even if they resort to more conservative hot-weather comforts such as electric fans at night, or air-conditioned movie houses, they are still asking for trouble.

Such persons have poor regulation of body heat, and sudden drops in temperature are likely to bring on their trouble in aggravated form, explained Dr. Harry S. Bernton, professor of hygiene at Georgetown University, in a talk given under the auspices of Science Service over the Columbia Broadcasting System.

Dr. Bernton described the mechanism by which chilling of the skin provokes paroxysms of sneezing.

"When cold air strikes the skin, there is an immediate loss of heat. The warmer body radiates its heat to the colder environment. One of Nature's inexorable laws is the conservation of body heat. This is effected by the contraction or shutting down of the blood vessels in the skin—a mechanism quite analogous to shutting off the heat from a radiator by closing the valve.

"A diminished volume of blood now courses through the skin, whereas the excess of blood finds its way in part into the mucous membrane of the nose. Herein are located the so-called turbinate tissues or 'swell bodies,' which act very much like the ordinary sponge. Their volume varies with the volume of contained fluid. The engorgement of the turbinate bodies causes the familiar sniffling; and the consequent pressure upon the nerve endings in the nasal mucous membrane gives rise to sneezing. This is a common experience.

"The congestion of the 'swell bodies,' irrespective of cause, is indicated by sneezing, fullness of the nose, and nasal discharge. These reactions of the nasal tissues are more marked in the case of hay-fever subjects due to impairment of nerve functions. Therefore, the effects and symptoms are more lasting than in the normal person."

Hay fever is predominantly an American disease, Dr. Bernton stated. This is not because Americans are peculiarly susceptible, but because the ragweeds, which cause over 70 per cent. of all cases of hay fever, are exclusively American plants.

Ragweed pollen will not be flying until mid-August, so that the really heavy sneezing will not begin until then. Hay fever victims who are suffering their annual martyrdom at present are mostly susceptible to tree pollens, which cause the spring hay fevers, or to the first flowers of grasses and plantains, which are the principal provokers of summer sneezes.

Science News Letter, June 23, 1934

RADIO

ANIMALS IN THE U. S. NATIONAL PARKS

an address by

George M. Wright

Chief of the Wild Life Division, National Park Service

Wednesday, June 27, at 3:30 p. m., Eastern Standard Time, over Stations of the Columbia Broadcasting System. Each week a prominent scientist speaks over the Columbia System under the auspices of Science Service.

ASTRONOMY-PHYSICS

Cosmic Rays May Originate In Rare Super-Novae

California Scientists Suggest Briefly Flashing Stars May Emit These Extra-Galactic Rays as Well as Light

COSMIC RAYS, the mysterious radiation which bombards the earth from all sides, may originate in the strange rare phenomena during which stars flare up with sudden bursts of energy that make them shine as bright as the planets.

This is the theory of cosmic ray origin advanced by Dr. W. Baade of the Carnegie Institution's Mt. Wilson Observatory and Dr. F. Zwicky of the California Institute of Technology in a report published in the *Proceedings of the National Academy of Sciences.*

The special "erupting" stars which Drs. Baade and Zwicky believe cause cosmic rays are called super-novae. Literally translated, novae stars would mean "new" stars but they are really temporary stars. After traveling through space for eons of astronomical time they suddenly flare up and reach a brightness which, on occasions, has rivaled that of the brightest of all stars, Sirius. Some super-novae in distant nebulae produce as much light as does the whole star system which contains them.

In the short space of a few years the shining splendor of the novae type stars fades away to their former obscurity.

Novae flare-ups are rare occurrences which last about as long in comparision with the millions of years in astronomical time as the fleeting flare of a rocket compares with a century.

Radiate Half Their Mass

Super-novae stars, declare Drs. Baade and Zwicky, are ordinary stars which blow up like a bursting shell. The velocity of expansion of the star may, in some cases, be nearly that of the speed of light. Some stars, in the process, may lose over half their mass by radiating it away into space. Visible and ultraviolet light are known to come off in the star eruption. It is suggested now that cosmic rays may be emitted at the same time.

The Pasadena scientists ask that cosmic ray observers call attention promptly to any systematic intensity changes that last even a few days. If such information were obtained quickly enough astronomers could push the search for possible novae stars. Cosmic ray intensities fluctuating over a period of years in rhythm with the appearance of super-novae stars would be strong support for the new hypothesis.

Applying their theory of novae bursts to cosmic rays, Drs. Baade and Zwicky point out that in all the discussion about cosmic rays there is only one point on which all the investigators—Millikan, Compton, Regener, Hess and others—agree; cosmic rays originate outside the star system which contains the sun and its companion earth.

Extra-Galactic Origin Fits

This general agreement on the extra-galactic origin of cosmic rays, declare the California scientists, fits their hypothesis of the emission of cosmic rays by super-novae stars. Cosmic rays do not come from within our own star system for the simple reason that no super-novae flare-up has occurred near the neighborhood of the earth during the twenty years in which cosmic rays have been studied systematically.

Moreover, the Pasadena investigators add, their theoretical deductions on the possible intensities of cosmic rays, which would come out of erupting novae stars, correspond to the observed intensities.

Astronomical calculations lead also to the belief that super-novae type stars should occur in any particular star system like our Milky Way once in 1,000 years on the average. Some time between 1934 and 2934, therefore, the scientists of the future—if they are still interested in cosmic rays—will probably have a chance to test the Baade-Zwicky theory. During the next thousand years one star in the system containing the sun should flare up and become a super-novae. If this happens, say Drs. Baade and Zwicky, cosmic ray intensities should increase a thousand fold.

It will not be necessary, however, to wait 1,000 years for a test of the new hypothesis. There are about 1,000 star systems, or nebulae, which are comparatively near the earth. Every year, therefore, some one of these ought to have a star eruption. Such annual eruptions should be sufficient to change cosmic ray intensities on the earth by about one per cent. over a period of a few days.

Science News Letter, June 23, 1934

CHEMISTRY

Mysterious Explosive Is Only Ammonium Picrate

"SECRET Naval Formula for Explosive D found in Airplane Wreck." So read the headlines following the crash of the airliner in the Catskill Mountains of New York state.

Thus was launched a drama for the press, involving all those things dear to an author's heart; a mystery explosive, a chemist capable of making that explosive, and "secret" naval documents.

Today the mysterious explosive D stands revealed as the Navy's simple symbol for a common high explosive used for making shells burst—ammonium picrate. The equally mysterious "naval documents" have turned out to be the specifications for making ammonium picrate (no great chemical feat) which were carried by the chemist of a company bidding on Naval contracts for its fabrication.

Ammonium picrate, leading actor for a day in the great naval mystery, comes from carbolic acid, or phenol, familiar to everyone in weak solutions as a disinfectant; or when moderately strong, as a poison.

Treat carbolic acid properly with nitric acid and sulfuric acid, and the result is picric acid, a yellow, crystalline solid. Picric acid by itself is a valuable but somewhat outmoded explosive. Every nation has its own secret method of making it. Thus the English make "lyddite," the French "melinite" and the Japanese "shimose."

Going a step beyond simple picric acid, ammonia is added to make the organic salt of picric acid, ammonium picrate. And therewith the "lone wolf" element nitrogen is brought into the final product.

Nitrogen present in the air man breathes is often called an inert ele-

ment, because it dislikes to join readily in a working alliance with other atoms. Viewed from the other side, however, nitrogen is a very active element, for once joined to other atoms in a compound it strives energetically to get out of the combination. This readiness of nitrogen to free itself is used by man to provide the force which bursts great shells and explodes the war-heads of torpedoes.

Science News Letter, June 23, 1934

AGRICULTURE

Giant Toad Kills Grubs; Saves Puerto Rican Sugar

PUERTO RICO'S sugar crop mainstay of the island's economic life, has been saved from a menacing insect pest by a giant toad. The pest was the white grub, larva of the beetle known in the United States as the May beetle, or more widely though less correctly as the Junebug. The rescuer was a toad known scientifically as *Bufo marinus,* imported into the island from Barbadoes and Jamaica. The drama of the salvation of an industry by a clumsy but benevolent batrachian is told by Dr. George N. Wolcott, entomologist of the Insular Experiment Station at Rio Piedras.

In Puerto Rican cane fields white grubs swarmed everywhere in the soil, eating off the roots, as they do the roots of the strawberries and other plants in the "States." Search for natural enemies, such as parasitic wasps, was only partially successful, and planters had been reduced to the rather desperate expedient of having the grubs picked out by hand.

Then, through a half-accidental chain of circumstances, two lots of the giant toads were brought to Puerto Rico and liberated in the fields. In a short time their progeny had multiplied into millions. They fattened upon the beetles that were the parents of the white grubs, until beetles and grubs alike changed from a swarming plague into an actual rarity. Now, entomologists who want some of the grubs for scientific purposes have rather a hard time finding enough of them. And the Puerto Rican sugar cane is freed of its most formidable enemy.

Bufo marinus is Latin for "sea toad" —why, nobody knows, for like all toads this lumpy friend of the Puerto Rican planter shuns salt water and breeds only in freshwater ponds. The female is a veritable giant among toads, being fully six inches from her nose to where her tail would be if she had one—more than double the length of the ordinary American toad. The breeding season lasts the year round, which of course makes for extremely rapid increase when the food supply is good.

The food habits of the great toad were carefully studied by a Puerto Rican woman naturalist, Mrs. Raquel R. Dexter. She found that *Bufo* makes nearly a third of his meals off the cane-destroying May beetles. These are excellently adapted for toad-food, for they are nocturnal like the toads themselves, fly but little, and when on the ground are slow-moving and easy to catch.

Aside from the beetles, *Bufo* feeds to some extent on a few other harmful insect species, though not as much as might be desired, as well as on millipeds or "thousand-leggers," many harmless kinds of insects, and all manner of other creeping things. He has even been known to eat mice; but the accusation that he kills young chicks has been proved to be without foundation.

One bad habit he has: he eats bees. He lurks under the hives where they are set on the ground, and snaps the bees as they come out. This, however, can be avoided by the simple device of setting the hives on raised stands, or by putting toad-tight wire netting around the apiaries.

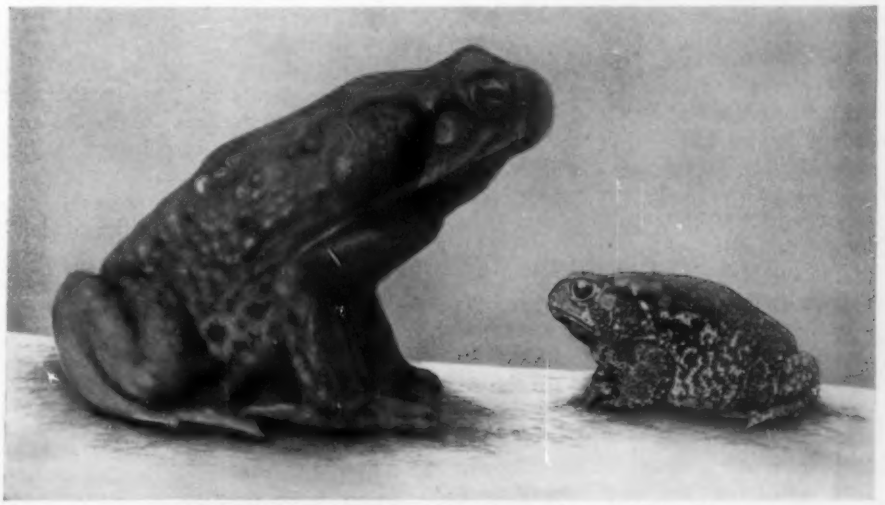
Bufo bids fair to become almost as famous a traveller as the American mosquito fish, *Fundulus.* Already he has been transplanted experimentally to Hawaii and the Gulf States, and colonization in Florida was held up only by the question whether these monsters might not terrorize squeamish tourists from the North. A lot of the toads was even taken to the island of Mauritius in the Indian Ocean, but the conservative authorities there would not permit them to be introduced, though their cane fields are suffering severely from white grub infestation.

But whatever may be his reception elsewhere, Puerto Ricans are enthusiastic about *Bufo marinus.* A sanguine local entomologist has even suggested the heraldic lamb be removed from the territorial coat-of-arms, to yield place to the Toad that saved the Island.

Science News Letter, June 23, 1934

It is reported that a trial shipment of 47 tons of New Zealand beef, refrigerated with carbon dioxide, landed in London in excellent condition.

A search in Canada for domestic clay for oil refining has yielded a Canadian clay reported to be more efficient than any imported clay available there.



VERITABLE HIPPOPOTAMUS OF A TOAD!

How the giant toad, Bufo marinus, imported into Puerto Rico to save the island's sugarcane crop from swarming white grubs, looms above an ordinary American toad. The picture is a composite of photographs of the two toads on a common background. The big toad has a body length of six inches, twice the length of the smaller animal.

PHYSIOLOGY

Proteins in Tobacco Injure Sensitive Persons

DISEASE of the blood vessels, irregularity of heart action and migraine headaches may be caused by smoking in persons who are sensitive to tobacco, Dr. Joseph Harkavy of New York City, reported to the Association for the Study of Allergy.

It is not the nicotine of the tobacco that causes trouble in these persons. The nicotine may produce symptoms of poisoning in people generally, but another part of tobacco, the protein in it, may cause trouble for sensitive individuals, just as the protein of eggs, milk or wheat causes trouble in certain other sensitive individuals who are what physicians call allergic.

Dr. Harkavy's work has not gone far enough for him to state definitely how big a part tobacco sensitivity plays in the production of a certain type of heart and blood vessel disease. He thinks that if persons who are sensitive smoke enough they may get the disease. Many persons, however, show sensitiveness to tobacco without any disease symptoms.

The sensitiveness is determined by skin tests such as are made on hay fever sufferers to find what pollens affect them. Over a third of the population is sensitive to tobacco so far as skin tests show, Dr. Harkavy reported.

Science News Letter, June 23, 1934

MEDICINE

Varicose and Gastric Ulcers Show Similarities

A SIMILARITY between stomach ulcers and the ulcers of varicose veins was pointed out by Dr. Penn Riddle of Baylor University Medical College, Dallas, Texas, at the Cleveland meeting of the American Medical Association. Dr. Riddle believes that these two conditions, which are responsible for much suffering and disability, are very much alike, and he finds that both may be helped by the same type of treatment.

Varicose veins of the legs are the result of poor circulation. The blood, instead of flowing back to the heart, tends to become stagnant in the veins of the legs, giving the familiar picture of swollen veins standing out on the legs. Eventually ulcers form. Ulcers form in the stomach in the same way, he suggests.

A cast and bandage which support the veins and help to pump the blood out of them give relief to the persons suffering with varicose ulcers. A rubber bandage which supports the abdomen similarly gives relief to stomach ulcer sufferers, he has found.

This support is to be used in addition to the standard treatment of stomach ulcers by diet, rest and operation, and not as a substitute for these measures. But if the supportive bandage is used early in the treatment, operation may be unnecessary. If an operation must be performed, the bandage will prevent recurrence of the ulcers, Dr. Riddle thinks.

Science News Letter, June 23, 1934

ARCHAEOLOGY

Famous City of Rayy Yields First Relics

THE FAMOUS walled city of Rayy, in Persia, has already begun to give up its buried secrets to the American expedition which began digging three weeks ago.

More than a hundred gold coins minted about 1150 A.D. and scores of broken pieces of household pottery have come to light, is the first field report received at the University of Pennsylvania Museum. The University Museum is working jointly with the Boston Museum of Fine Arts to explore the site.

Great discoveries are expected from this city, which has lain in ruins since its destruction by Mongols in the thirteenth century, and which in the tenth century was called the most sumptuous city in the world next to Baghdad. The city, lying about five miles from Teheran, was occupied from prehistoric times, and was the scene of battles and other dramatic incidents in apocryphal books of the Bible.

"Successive fortifications of the acropolis will be studied in the citadel," says the report by Dr. Erich F. Schmidt of the University Museum, field director. "In the governmental district are low elevations partially covered with thousands of stucco fragments which mark the sites of important buildings of the Islamic and possibly the pre-Islamic periods."

The American expedition has permission from the Persian government to excavate not only the walled city but the entire valley of Shah Abdul Azim, an area of fifty square miles.

Science News Letter, June 23, 1934

IN SCIENC

SEISMOLOGY

Kurile Islands Shaken By Quake

A SHARP earthquake rocked the region of the Kurile Islands between Japan and Kamchatka on Tuesday, June 12, at 8:51.3 p. m., eastern standard time. From telegraphic reports to Science Service, experts of the U. S. Coast and Geodetic Survey located the epicenter of the quake at 44 degrees north latitude; 147 degrees east longitude. This would fix the center of the disturbance on or near the island of Urup, northeast of Japan and southwest of the Kurile Islands.

American stations reporting the earthquake were: Georgetown University, Washington, D. C.; Fordham University, New York City, and Honolulu, T. H.

Science News Letter, June 23, 1934

AVIATION

Avoid Propeller "Fatigue" By Study of Vibrations

SERIOUS and sometimes fatal accidents which come as a result of a broken airplane propeller may now in a large part be prevented as the result of a careful study of vibrations.

Almost all propeller failures come as a result of "fatigue," that is, cracks and fissures are slowly formed in the blades under conditions of excessive vibration. Eventually, if the blade is not repaired or replaced a break occurs, which means a forced landing.

Drs. Hugh L. Dryden and L. B. Tuckerman of the National Bureau of Standards have been making a study of the causes of failure at the request of the Department of Commerce. They have devised an instrument which operates on the general principle of a Baldwin telephone receiver. It is placed on the propeller shaft and records electrically the amount of vibration in the propeller at any speed. Thus the critical speeds, those at which the vibration is the greatest, can be avoided by adjusting the throttle.

Science News Letter, June 23, 1934

NCE FIELDS

MEDICINE

Vitamin A Is Not A Common Cold Preventive

TWO HUNDRED medical students, nurses and hospital staff physicians of Cleveland turned themselves into human guinea pigs in order to settle the question whether vitamin A, sometimes called the anti-infective vitamin, really could help ward off such infections as the common cold.

At the meeting of the American Medical Society, Dr. Gerald S. Shibley and Dr. Tom D. Spies of Cleveland reported the results of the experiment. Evidence indicated that while the vitamin might shorten the duration of a winter cold by two or three days, it did not keep the experimental group from having as many colds as usual. Neither did it lessen the severity of the colds.

Science News Letter, June 23, 1934

MEDICINE

Study of Timothy Flowers Helps Hay Fever Victims

HAY FEVER victims, who owe their distress to their susceptibility to timothy pollen, are the indirect beneficiaries of researches on the flowering habit of timothy conducted by Dr. Morgan W. Evans of the Timothy Breeding Station at North Ridgeville, Ohio, as reported in the *American Journal of Botany*.

The investigation embraced studies on the flowering habits of the plant, methods of collecting the pollen, and the effect of fertilizers, climatic conditions, and the time of year on the production of pollen.

Timothy blooms, according to Dr. Evans, at very definite periods of the day, usually the largest number of florets opening about sunrise.

The pollen, from which extracts for the alleviation of hay fever are made, may be collected by harvesting the stems on afternoons during the flowering season and placing them with the heads over sheets of paper. On the following morning the florets usually bloom in much the same way as in the field. The pollen may then be shaken off and collected on the paper.

The largest yields of pollen, Dr. Evans explains, are usually produced on days when the temperature is about normal or above normal, and when there is no rainfall and a relatively high percentage of sunshine. As long as favorable weather continues, the process of blooming occurs at about the same time each day during the flowering season. When the weather becomes cloudy or rainy, and especially if the temperature becomes subnormal, the process of blooming may be suppressed for one or even two days. When favorable weather conditions return, the florets bloom in unusually large numbers.

By growing early and late varieties of timothy, Dr. Evans was able to collect pollen for two weeks longer than usual.

Science News Letter, June 23, 1934

GENERAL SCIENCE

Six Scientists Added To Science Advisory Board

ROUNDING out the membership of the U. S. Science Advisory Board to include authorities in additional fields of science, President Roosevelt by executive order has added six scientists to the board, increasing its membership to fifteen.

The new members are: Prof. Roger Adams, chairman of the University of Illinois department of chemistry and president-elect of the American Chemical Society; Dr. Simon Flexner, director of the Rockefeller Institute for Medical Research; Prof. Lewis R. Jones, University of Wisconsin plant pathologist; Prof. Frank R. Lillie, zoologist and dean of the University of Chicago's division of biological sciences; Dr. Milton J. Rosenau, professor of epidemiology, Harvard School of Public Health; Dr. Thomas Parran, New York State commissioner of health.

Like the original nine members of the SAB, the new appointees will serve until July 31, 1935.

The Science Advisory Board was created by President Roosevelt on July 31, 1933, to aid him and his department heads in the conduct of science and research in the federal government. It has held numerous meetings to give advice on problems presented to it by government officials.

Science News Letter, June 23, 1934

ETHNOLOGY

Tone Photography Used To Preserve Indian Music

A NEW way to insure immortality for the ancient native music of America is advocated by Dr. Carl E. Seashore, head of the department of psychology of the State University of Iowa.

The method, which Dr. Seashore has successfully employed to record music of white and Negro singers, consists in using scientific apparatus to photograph the sound waves as a singer's voice is heard. The sound wave picture thus obtained is plotted in wavy lines on a graph, which is, in shorthand, an exact record of the pitch, the intensity of tone, the timbre of the voice, and the tempo.

Everything that is conveyed from the singer to the listener, whether it be information, emotion, or a drive to action, is expressed through these four media in the photographic record, Dr. Seashore states in a report to *Science*.

For his test of the laboratory method of preserving the native American music, Dr. Seashore chose a phonographic record of a song by a Sioux Indian. The phonographic recording was done at the Century of Progress by Miss Frances Densmore, well known for her studies of the music of Indian tribes.

Dr. Seashore believes that the phonophotographic apparatus can in some instance be taken directly into the field for the recording of Indian songs in villages and reservations.

Science News Letter, June 23, 1934

PHYSIOLOGY

Toads Aid Scientists In Test of Pregnancy

TOADS of a South African clawed variety may be used by physicians to answer the important question of pregnancy, Drs. H. A. Shapiro and H. Zwarenstein of the University of Cape Town's Department of Physiology have reported to *Nature*.

The test performed by injecting secretions of the patient into female toads takes only about eighteen hours. It is a modification of the well-known Zondek-Ascheim test in which the usual test animal is the rabbit.

The toad tests are also being used to investigate the incorrect functioning of human glands.

Science News Letter, June 23, 1934

MEDICINE

A Depression Without Its Disease

The Hard-Times Affliction, Pellagra, Has At Last Been Successfully Combatted Through Use of the P-P Factor

By JANE STAFFORD

FOR the first time in history, the southern states have gone through a period of economic depression without the usual epidemic of pellagra, hard-times disease of other moneyless periods.

Is this because one hardworking, self-sacrificing disease-fighter, Joseph Goldberger, found that pellagra could be prevented and cured by proper diet?

Yeast and vegetable gardens seem to have routed pellagra, but Dr. Goldberger is not here to see the triumph of his teachings. To be sure, not all scientists have accepted his teachings. The last chapter on pellagra may not have been written yet. But whether or not his explanation of pellagra was sound, his advice about it seems to have worked.

Dr. Goldberger's story starts in Hungary, where he was born on July 16, 1874. He spent the first years of his life on his parents' farm south of the Carpathian Mountains. When he was six his parents brought him to America. He grew up in New York's lower East Side where his father had a grocery store.

Perhaps it was there that he learned to know human nature so well that he thought to notice whether the nurses in a state hospital gave themselves better food than their helpless patients, whether the big boys in the orphan asylums got more to eat than the younger, weaker ones. Because it was from such tiny clues that he found the solution of the pellagra problem, so that poor folks in the South, never so poor as they have been recently, are free from the pain and the worry of pellagra.

Tables Turned

Just twenty years after his arrival in the Promised Land to which he was to contribute so much, the young Dr. Goldberger found himself examining immigrants at Ellis Island. This was his first work for the U. S. Public Health Service, to which he had been appointed soon after leaving medical school. You can imagine how proud and thankful he must have felt when, in his bright new uniform, he walked down the line of immigrants and remembered himself as a six-year-old lad, twenty years before, waiting in that same line while an imposing uniformed official scrutinized and questioned each one.

His unusual qualifications for research work were soon recognized, and in 1904 he was ordered to the Hygienic Laboratory, now the U. S. National Institute of Health, in Washington, where Uncle Sam's disease fighters have their headquarters.

By this time the first case of pellagra had been reported in the United States. During the years that followed, while Dr. Goldberger was solving special questions concerning diphtheria and measles and other diseases, pellagra was becoming more and more of a problem. At times it seriously interfered with farming and industrial work in certain parts of the country.

Was Spreading Rapidly

One of the field workers of the U. S. Public Health Service, Dr. C. H. Lavinder, had reported: "Like a mushroom, pellagra is coming up overnight, spreading everywhere." It was reported to be driving people crazy and killing them.

Back in Washington, the chiefs of Uncle Sam's disease-fighting corps held a conference and the upshot of it was that Dr. Goldberger was assigned to investigate and, if possible, to find a way to control pellagra.

He did not know a thing about pellagra, and another man in his position might well have been dismayed. But not Dr. Goldberger. Characteristically he set to work. First, he got every book that said anything about the disease, every report that had been written on it. He read them all and studied them well. Then he went out into the field.

The story of his wanderings through the South, his poking into orphanages and prisons and asylums, is one of the most dramatic chapters of public health history. He went to the towns where so many of the mill hands had the disease that sometimes the mills could not be kept running. He went to the farming villages and saw more of the poor, sick pellagrins in every stage of the disease. He found that "the fully developed disease makes a picture which, when once seen, can hardly ever fail to be recognized even by one who is not a physician."

The eruption is the most characteristic telltale of the disease. When this rash first shows itself it looks very much like sunburn and frequently was mistaken for it. The sunburned appearance soon changes and in many cases the reddened skin turns to a somewhat dirty brown, often looking like dried old parchment. Then the skin becomes rough and scaly or cracks and peels. An odd thing about this eruption is that its favorite

DR. JOSEPH GOLDBERGER

Pioneers of Medicine

The accompanying article is the first of a series describing the romantic experiences of those who have contributed to the great battle against disease and suffering. This story of an immigrant boy who discovered a preventive of the dread scourge of the poverty-stricken will be followed by others recounting the principal attacks on other American plagues.

places are the backs of the hands, forearms, and backs of the feet. Another odd thing is that if the back of one hand or one cheek is affected, the same place on the other hand or cheek will soon have the same-sized spot of dirty, red-brown rash.

After the rash has appeared, the patient begins to feel tired, "worked out," and has indigestion, is nervous and dizzy. Pains in his muscles and bones keep him awake, and he has a burning, scalded feeling of the tongue and mouth. Many died of the disease, and some had their minds affected, so that the poor patients had to be put away in asylums.

Watching the Trays

Here in the asylums, Dr. Goldberger got his first clue to the cause of the disease, and to a method of prevention and treatment. Some of the best scientists at that time thought pellagra was contagious, but how could that be? questioned Dr. Goldberger. None of the nurses or doctors or attendants, even in asylums where patients in the last, worst stages had to be cared for, ever got the disease from their patients, he was assured. Some doctors held that it came from eating bad food, so Dr. Goldberger next inquired what the patients ate. He was told the food for patients and staff was all the same. But in the dining room, he watched the meals served, and his quick eye saw the glass of milk and portion of fresh meat by which a nurse's tray differed from her patient's.

He kept this clue in mind when he visited an orphan asylum, where every spring pellagra attacked the roustabout children between six and twelve years old. Why just this group? he wondered. He watched closely in the dining room again. Sure enough, their food was different. This roustabout group were too big for babies' milk, and too small to earn meat by doing chores, so they got neither, and they were the ones that were afflicted with the red rash and sore mouths and tired feelings of pellagra.

Then he tried his first experiment. He gave these roustabout children fresh milk to drink every day, and a generous helping of fresh, lean meat, either beef, veal or mutton, with their dinners. The roustabouts ate this new diet all winter and in spring not one of them had the least bit of rash or any other sign of pellagra, though a few, at least, had always suffered from it every spring in the past.

Grits and "Fat Back"

Meanwhile, Dr. Goldberger had gone back to the mill villages and the farm towns and asked the people, especially the pellagra sufferers, what they ate. Biscuits, corn bread, grits, gravy, syrup and collards, chiefly. Little or no milk, no meat except "sow back" or fat salt pork. Sometimes the pellagra sufferers had had a more varied diet, but Dr. Goldberger found that these patients were finicky eaters, and only nibbled at the food that might have prevented their attack of pellagra.

The disease always appeared first in the spring, lasted into the summer, but if the patients lived, they got better in the fall. That was because the summer brought a more varied diet with vegetables, eggs and maybe a little more fresh meat and milk, he was sure.

Convicts Volunteer

With all these facts in mind, Dr. Goldberger undertook his next feeding experiment. Twelve convicts, on the offer of pardon and medical attention if they became ill, volunteered to take part in it. Their bill of fare consisted of the same unappetizing, monotonous food that the poor whites of the South lived on during financial depressions and got pellagra from, in Dr. Goldberger's opinion. The controls, mostly officials of the Rankin Prison Farm of the Mississippi State Penitentiary, where the experiment was made, were given the same menu with the addition of milk, butter, lean meat and eggs. Of the eleven volunteers (one had to be dropped because he developed another disease early in the experiment) six developed pellagra while all of the controls remained in good health.

Exposed Himself

But even this experiment failed to convince the other scientists of the world. The germ theory of the disease was still held by many eminent men. So Dr. Goldberger tried, seven times, to give himself the disease in any of the many ways that germ diseases can be transmitted. He injected blood and material from the sore skins of dying pellagrins into his arm and into the arms of his wife and loyal colleagues. He and some of the others swallowed pills made of the intestinal discharges of these dying pellagrins. The whole world expected them to get pellagra and die, but they did not.

However, Dr. Goldberger was not satisfied. He wanted to stop the ravages of this horrible disease and he was a practical man. He realized that fresh meat and milk were beyond the reach of

MILK PROTECTS THEM

No pellagra for these "roustabouts" who are getting fresh milk from the Red Cross for their school lunch — it was the roustabouts in a Southern orphanage, where milk was reserved for the babies and meat for the big boys doing chores, who suffered from pellagra each year and whose diet gave Dr. Goldberger the first clue to the cause.

the poverty-stricken inhabitants of the South.

He came back to Washington, to his old quarters in the Hygienic Laboratory, wondering how he was going to find a cheap food that would prevent pellagra. Then at just the crucial moment, he heard of some experiments that had been going on at Yale University. The Yale investigators had been trying to find the effect of meatless diets on dogs. What they found was that their dogs got sick, had very sore mouths, and died of a disease called black-tongue which was very much like pellagra in human beings.

Experimental Animals

This gave Dr. Goldberger just what he needed—a handy way of studying the pellagra-preventing value of various foods. If, as he soon found to be the case, black-tongue disease of dogs is the same as human pellagra, the foods that cure the dogs of black-tongue will cure pellagra too.

He found the pellagra preventive, which he called P-P factor, in a number of vegetables and milk, butter, lean fresh meat and eggs. Finally, he discovered it in yeast, just in time to save the lives of the victims of the Mississippi flood in 1927. A small amount of this cheap stuff, either fresh or dried, will cure or prevent pellagra. Even the poorest folks, who cannot buy milk or fresh meat, can pay three cents a day for the yeast that will protect them from pellagra.

Death Cut Short Work

In the midst of his investigations on the pellagra-preventive factor of foods, Dr. Goldberger was called on to make his last fight against disease. Although he had risked his life many times before, disease came uncourted this time, and death followed despite all the efforts of fellow scientists and his colleagues of the U. S. Public Health Service. On January 17, 1929, he died at the Naval Hospital in Washington, a victim, not of any disease he had investigated, but of a tumor of the kidney.

So he did not live to see pellagra routed during the worst depression in history, as a result of his discoveries and research. For while all scientists are not yet convinced that pellagra results from lack of a certain vitamin, as he thought, the Red Cross has heeded his teachings. When the first effects of the present depression became apparent, the Red Cross started distributing yeast to the poor people in the South and encouraged and helped them to plant vegetable gardens and to can the surplus vegetables for the winter's use.

There has been no devastating epidemic of pellagra during this depression, in fact, the pellagra death-rate has been reduced by about one-third. Regardless of whether his theories were right or wrong, the practical teachings of the immigrant boy who grew up to be a great scientist seem to have saved thousands from pellagra suffering and death.

Science News Letter, June 23, 1934

SUFFERING

This patient not only has on his hands the symmetrical pellagra rash, but, judging from his expression, is also suffering from the mental depression which is a striking feature of pellagra—the victims of this disease are sometimes so affected mentally that they have to be confined in hospitals for mental disease.

MEDICINE

Glands May Play Part In Cancer Among Women

DISTURBANCE of certain glands, particularly the pituitary gland at the base of the brain, may play a part in the development of cancer of the child-bearing organs, Dr. J. Isfred Hofbauer of Cincinnati told members of the American Medical Association.

Cancer patients were improved by treatment which slowed the activity of their pituitary glands, before their cancers were treated locally, Dr. Hofbauer reported as evidence of the influence of the pituitary on this type of cancer.

This approach to the cancer problem is based on the theory that the pituitary which stimulates normal growth also acts as a stimulant to the excessive growth of cells that eventually become cancer. According to the new view explained by Dr. Hofbauer, the prolific growth of cells before the birth of a child may be caused by a change in the balance of the glands of internal secretion. This overgrowth has been known to remain for months after the birth of a child and it may be that it persists after several experiences of childbirth. Experiments have shown that the same type of overgrowth of cells can be produced in guinea pigs and monkeys by giving them pituitary hormone.

Further indication that the glands may influence the development of cancer is seen in the fact that this type of cancer occurs so frequently toward the end of the childbearing period in women's lives when a change in the balance of the glands and the body functions takes place naturally.

Heretofore cancer of the childbearing organs has been attributed to injuries received during childbirth with resulting chronic infections. The army of cancer fighters is beginning to doubt whether this is an adequate explanation in all cases, Dr. Hofbauer said.

Science News Letter, June 23, 1934

ORNITHOLOGY

Young Desert Hawks Secure in Natural Fort

See Front Cover

DOUBLE defiance to a hard and hostile world is offered by the splendid pair of young desert hawks pictured on the cover of this issue of the SCIENCE NEWS LETTER. In addition to their own armament of beak and claw, formidable even in their immature state, these hawklets have around their nest in the top of a tree yucca a forbidding *cheval-de-frise* of down-pointing, spine-tipped tough leaves that defies any climbing enemy. Bristling birds in a bristling home, they are the very epitome of the rugged and truculent self-sufficiency that is the price of survival in the wilderness.

The picture, taken in the recently established Carlsbad Caverns National Park, constitutes striking evidence that there are worthwhile things to see under the vast open desert sky in this region, as well as in the caverns' tremendous depths. The birds of Zeus, no less than the bats of Dis, are worthy of our attention when we ride into the West in search of wonders.

Science News Letter, June 23, 1934

METEOROLOGY

Drought Causes Still Obscure; Alleged Cures All Futile

Sunspot Correlation Subject of Debate Among Scientists; Forests Again Championed as Moderating Influence

ARE SUNSPOTS the cause of the drought?

The answer to that question will depend upon what scientist is at the receiving end of it. For meteorologists and the men who study solar physics are not in agreement over the matter. As it stands at present, the answer would have to be a kind of double Scotch verdict: "Not proven. Also, not disproven."

Prominent among the scientists who believe that there may be a definite and rather close correlation between weather and the spottedness of the sun is Dr. C. G. Abbot, secretary of the Smithsonian Institution. He has spent many years in the study of sunspot cycles, or periods at which spots on the sun become most numerous, and then wane again.

It has taken a long time merely to devise statistical methods suitable for unscrambling the numerous cycles of varying lengths, which overlap and thus obscure each other. But finally he has worked out a culminating period of about 23 years, approximately double the most pronounced of the sunspot periods, which is a little over eleven years.

At the same time, H. H. Clayton, who edits the Smithsonian Institution's notable publication, *World Weather Records,* has developed a theory of a sunspot mechanism that could account for changes in weather here on earth. When there are many spots, the sun is pouring more radiant energy into space.

Weather Cycles Not Denied

Impact of this surplus energy on the earth causes a displacement of the "centers of action" whence masses of warm and cold air start on their weather-making journeys, and thus also changes the tracks followed by these air-mass migrations. The dislocation of the customary storm-tracks, such as we have had ever since last autumn, might well bring drought.

Meteorologists at the U. S. Weather Bureau, however, are not yet willing to trust the sunspot cycle method, at least to the extent of basing confident long-range forecasts on it. They feel that too much statistical manipulation is still necessary, and would like to have the whole thing put on a simpler and more direct basis before its use in practical everyday meteorology is attempted.

They do not deny the existence of weather cycles, however. J. B. Kincer, chief of the division of climate and crop weather, points out that the present drought, and those of the past three or four years, coincides with a steep drop in the curve of the Brückner cycle of approximately 35 years. Only, he says, this cycle and all others are not sharply defined. Nobody knows exactly when they begin and end.

Hence it is not safe, he holds, to predict when the upturn in the weather cycle will begin. The drought may end next week. Or the summer of 1935 may be worse than the summer of 1934. Mr. Kincer declines to guess which.

Raindrop Tennis With Clouds

When forests grow again on our denuded hills, will they help to prevent droughts? Do forests have any substantial influence on rainfall?

No, say many foresters and meteorologists. Yes, declare others, just as stoutly.

The earliest doctrine on the subject was that forests do have a modifying influence on rainfall and temperature. People noticed that forested regions were also regions of more even climate than open grasslands or sandy deserts. The assumption that the forests helped to produce the climate was easy to make.

Then arose a generation of scientists who claimed that the earlier idea was wrong-end-to. Equable climates, with well-distributed and abundant rainfall, would produce forests. Less rainfall, with higher evaporation rates, would permit only grasslands to develop; and still less rain would, of course, produce desert. Strip the forests away, they said, and the climate would remain substantially unchanged.

This view, which is perhaps still the majority opinion in scientific circles, has been sharply challenged by one of the best known of American foresters, Prof. Rafael Zon, now at University Farm, St. Paul.

Forests, Prof. Zon holds, play raindrop "tennis" with the clouds, picking up the water that falls and tossing it back into the air. Forests are therefore important factors in the distribution of rainfall over a continent.

Only two-ninths of the water in a rain-cloud comes directly from the ocean, Prof. Zon has stated. The rest has already fallen at least once as rain —possibly many times. It has been taken from the land, and will fall again upon the land. And forests, he said, send into the air far more water than do grassy plains or areas of bare soil.

Radio Moratorium Demanded

Radio is taking first honors—or dishonors—as the cause of the drought, in hundreds of crank letters and telegrams that daily find their way to the office of the U. S. Weather Bureau. Most of them are addressed to President Roosevelt, some to the Department of Agriculture. All are routed to the Weather Bureau, where Prof. W. J. Humphreys, master of the art of diplomacy as well as of the science of atmospheric physics, patiently dictates courteous answers.

A few of the messages attempt something like scientific reasoning: "The broadcasting stations are putting so much current into the air that the rain-bringing currents never get a chance." Most, however, are dogmatic and peremptory: "Suggest you declare moratorium of radio broadcasts for eight or ten days: watch it rain!" read one urgent telegram to the President.

Suggested remedies for the drought are as fantastic as are the allegations of its cause. One man wrote that if you leave an egg on the end of a beam in the barn, rain would certainly follow. Scattering soap, he also suggested, was a good way of bringing rain. Another suggested shutting all windows in the houses and keeping them shut.

The old rainmakers' standbys are not lacking either. Over and over again Prof. Humphreys has had the evaporation of cooling chemicals urged upon him, as well as sending up airplanes with sand to sprinkle on the clouds, and hurling aloft large charges of explosives to be detonated high in the air.

None of these things, he explains, will avail to wring water out of arid air. Some of the proposed remedies are just naive magic: the scattering of soap, for example. This might be termed "associative magic," the basis of reasoning being that where there is soap there must surely be water.

Other proposed drought remedies, like the use of cooling chemicals and sprinkling sand from aircraft, smack of the scientific. They would expend energy enough to condense the water from vapor to liquid drops, and thus bring rain. But the amount of energy needed to assemble a rainstorm out of heated air is so great that all the rainmaking munitions that could be piled up over a whole township would not produce even a timid little shower.

Proposals to use explosives are the surest smile-provokers at the Weather Bureau. They have been advocated as rainmakers ever since the earliest days of gunpowder. They have also been advocated—and tried—as means of stopping hailstorms. Apparently a big, healthy "bang!" in the sky is supposed to bring whatever results are desired at the moment, whether more precipitation or less.

Science News Letter, June 23, 1934

ANTHROPOLOGY

Human Missing Link May Lie Entombed in Solid Rock

ONE of the most delicate tasks scientists ever had thrust upon them engages four men and women at the Royal College of Surgeons in London.

In the basement of the College lie tons of hard and heavy rock. In the large blocks may be seen outcroppings of bones, human bones, which the eminent British anthropologist, Sir Arthur Keith, pronounces "the most imposing specimens of fossil humanity I have even seen."

It is up to the squad of workers, led by Theodore D. McCown, an American, to get those fragile, brittle, imposing specimens of humanity out of their hard beds. To meet the situation, the squad is armed with an electric dental grinder, an electro-pneumatic chisel, scrapers, hammers, and an inexhaustible supply of scientific patience.

If the specimens of humanity can be freed without much damage, science will discover what a vanished race of men that lived 75,000 years ago was like. If the bones prove too crumbly, or the workers too impatient—? But such disaster now seems unlikely.

A cheerful report of progress on this job which the scientific world is watching has just been sent back home to America by Mr. McCown. His report comes to the American School of Prehistoric Research, of which Prof. George Grant MacCurdy of Yale is director. Mr. McCown and his assistants have been working eight months at their task, and will probably not be finished for many months to come. He tells of removing two tons of plaster and cement casing from two of the important fossil humans, and bringing to light such features as the hidden bones of fingers and toes and the vertebral columns of the unknown ancients.

The men and women whose skeletons are thus being extricated from solid rock with such gentle care represent the oldest inhabitants of Palestine. They lived in their time in caves along the Mediterranean shore. Their ungainly frames, even half buried in a matrix that cased itself about them, seemed to reveal to science a type of human anatomy not heretofore known. That is why they were dug out of their cave tombs in chunks, so to speak, and their release from the stone is now so eagerly watched.

The unknowns belong to the age of Neandertal Man, and have many points in common with him. But some at least of the Palestine men seem to have had higher foreheads and more man-like chins than the Europeans of that rather ugly stage of human development.

Were they nearer to modern humanity than their fellow Europeans? It is important to know, scientifically, for just after the slouching Neandertals rather mysteriously emerged the famous *Homo sapiens*, our own type of modern man; and these Palestinians may be a missing link in our ancestral line.

Science News Letter, June 23, 1934

An intensified campaign to eradicate diseases of cattle was begun in June by officials in 24 states.

PSYCHIATRY

Mental Diseases Described Frequently by Shakespeare

WAS Queen Elizabeth's favorite, Essex, the model for the misanthropic Timon in Shakespeare's tragedy, Timon of Athens? The suggestion that he may have been was made by Dr. Andrew H. Woods of the Iowa Psychopathic Hospital at the meeting of the American Psychiatric Association.

The Timon of Shakespeare's play suffered from the mental disease, paralytic dementia, which is due to syphilitic infection, Dr. Woods asserted. Shakespeare's picture of this disease is so perfect that Dr. Woods believes he drew it from the example of some prominent Elizabethan who suffered from it. There are so many points of resemblance between Essex and the hero of the tragedy as Shakespeare wrote it that Dr. Woods declared if there were documentary proof that Essex suffered from syphilis, it would settle the matter.

Shakespeare was greatly interested in mental diseases, evidently knew much about them and featured them in six of his plays, Dr. Woods pointed out. Hamlet in the play of that name pretended to have the mental disease, schizophrenia, while Ophelia in the same play showed signs of the real disease. Othello and Julius Caesar suffered from epilepsy. In addition, Othello showed the suspiciousness and savage violence of a sufferer from another mental disease, paranoia. King Lear gives a picture of the mental debility of old age. Lady Macbeth's sleepwalking and loss of memory show that Shakespeare knew the peculiar way in which hysterical patients behave.

The original Timon who lived in Athens was quite different from the character in Shakespeare's play. There is nothing in the brief accounts of him written by earlier historians and in another play about him to suggest that he had syphilis or the mental disease, paresis. Shakespeare in the first part of his play pictured Timon as much more attractive and capable than the Athenian actually was, and in the last part of the play the dramatist makes Timon's turning against his friends and the entire world not so much the result of his misanthropic nature as of the ravages of the disease which destroyed his mind.

Science News Letter, June 23, 1934

AGRICULTURE

NATURE RAMBLINGS

by Frank Thone

Aiding the Enemy

DROUGHT-weather inflicts a triple punishment on the farmer's crops: it deprives their roots of water, it demands and takes more water than their leaves can spare, and it encourages some of their worst foes among insect pests and plant diseases.

It is not altogether coincidence that the return of the grasshoppers in the West has dated from the drought years of 1930 to now. Grasshoppers thrive on drought. Dry soil through the winter, especially if the winter is mild, favors survival of their eggs, and dry soil which quickly warms in spring favors equally their hatching. A chill, wet spring delays the emergence of the young "nymph" grasshoppers, and when they do hatch either drowns them outright or encourages parasitic fungi that are their most serious disease-enemies. This year's dry winter, dry spring and (to date) dry summer has been almost unprecedentedly kind to the 'hoppers, and their swarms are now sweeping from North Dakota to New Mexico and thence across to California.

Chinch bugs, too, profit by drought and hot weather. Like grasshoppers, they over-winter in the soil, and like grasshoppers they travel most easily when there is dry weather during their migrating season. Their customary seasonal life-history, at least in the corn belt, is to infest wheat and other small grains during the spring and early summer. Then, when the July harvest deprives them of their first meal-tickets, they migrate into the cornfields to spend the rest of the summer sucking corn-juice. For this migration dry soil is more favorable than wet.

Drought not only provides this dry soil, but also stimulates their migration to the cornfields, by making short small-grain crops that mature early and must be harvested early—if at all. Thus this summer we had the spectacle in Congress of Senator Byrd, watchdog of the treasury and strong anti-Administration partizan, introducing and championing a bill to put a million dollars into the hands of his pet particular *bête noire,* Secretary Wallace, for fighting the drought-favored chinch bug in the warmer parts of the Secretary's own grain belt country.

Fungi are commonly regarded as profiting by moist weather—influenced, perhaps, by the way one's immediate personal possessions get mouldy in damp seasons but not in dry. However, such fungus-engendered plant diseases as wheat scab and the black-stem rust of grains seem to spread more rapidly in droughty summers. The dry air, doubtless, is favorable for the transport of their propagating spores, and morning dews on the leaves supply enough moisture to permit germination and entrance of the creeping microscopic fingers of the hyphal threads of these parasites.

Science News Letter, June 23, 1934

PHYSICS

Squeezing Turns Phosphorus From White to Black

BY SQUEEZING atoms of phosphorus with pressures of seven tons to the square inch Prof. P. W. Bridgman, research physicist of Harvard University, has just been able, for the first time in the history of science, to make this chemical element change its color from white to black by pressure alone.

Prof. Bridgman's latest achievement in the field of high pressures, in which he is a world-famous authority, is reported in a letter to the editor of the *Physical Review.*

In the squeezing process, where the pressures become comparable with those found only inside the earth, the phosphorus changes from the dangerously inflammable waxy-white form which has to be kept under water to prevent its spontaneous burning, into a darkish, non-inflammable relative.

Phosphorus, while never found free in nature because of its affinity for other chemical elements, is widely distributed throughout the world. It is, as one example, an essential ingredient of the protoplasm of the human body.

Science News Letter, June 23, 1934

The University of Michigan now has one of the most extensive collections of Tibetan art and anthropological material in the world.

Due to some chemical change in the manufacture, candles of some colors such as green and black seem to drip more readily than other colors.

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First Glances at New Books

Psychic Research

EXTRA-SENSORY PERCEPTION—J. B. Rhine—*Boston Society for Psychic Research,* 169 p., $2. The author, described by Prof. William McDougall in the Foreword as a "ruthless seeker after truth," was influenced by Prof. McDougall's writings and several years ago gave up a promising career in biology to devote himself to the scientific study of the psychic. The experiments reported were conducted over a period of three years at Duke University. From them, the author concludes that extra-sensory perception is a demonstrable fact. The book will interest two classes of individuals. Those willing to be convinced of the reality of telepathic or extra-sensory perception will find here a legitimate basis for their bias; those unwilling to accept such an interpretation will find an intriguing problem in the attempt to discover the "catch." Comments, questions, and criticism are invited by the author and by the Boston Society for Psychic Research.

Science News Letter, June 23, 1934

Pedagogy

MODERN EUROPEAN EDUCATORS AND THEIR WORK—Adolph E. Meyer—*Prentice-Hall,* 241 p., $2.50. The barrier of language, says Prof. Meyer, has shut many American educators off from knowledge of the progressive developments in teaching abroad. Hence, he has written this book telling about one or more schools or great teachers in practically every European country. Next to visiting the schools and observing the work critically at first hand, a European tour through the eyes of a good guide, like this author, is a broadening experience for an American teacher.

Science News Letter, June 23, 1934

Botany

A TEXTBOOK OF GENERAL BOTANY—R. M. Holman and W. W. Robbins—*Wiley,* 626 p., $4. The third edition of a successful textbook for colleges and universities.

Science News Letter, June 23, 1934

Forestry

THE PROFESSION OF FORESTRY—Arthur D. Read—*Macmillan,* 68 p., $1.25. One of the least debated and most enthusiastically welcomed acts of the New Deal was the establishment of American forests and their dependent timber industries on a firm economic, administrative and scientific basis. Forestry promises more professional openings for young men than ever before in this country's history. This little book, which tells directly and in simple terms what is expected of the young forestry graduate when he reports for his first job, and what chances are along the trail higher up, will be eagerly read by thousands of youngsters now endeavoring to orient themselves.

Science News Letter, June 23, 1934

Psychology—Sociology

AFTER THE SHUTDOWN—Ewan Clague, Walter J. Couper and E. Wight Bakke—*Institute of Human Relations, Yale,* 153 p., $2. Many studies of the unemployed are handicapped by the fact that, even in a period of great depression, the unemployed are a more or less selected group; the less able, less well-adjusted workers are the first to lose jobs and the last to find employment when good times return. This study is of what happens when the whole plant shuts down, throwing everybody out. Despite the willingness of the community to aid, the burden in such a case falls directly on the individual worker and his family. In job hunting, they rely almost entirely upon old and ineffective methods; only a fraction made any use of employment offices and the great majority had never even heard of any such institution.

Science News Letter, June 23, 1934

Mathematics

AN INTRODUCTION TO STATISTICAL ANALYSIS—C. H. Richardson—*Harcourt, Brace,* 285 p., $3. The fundamental notions of statistical analysis are presented in such a manner that they can be comprehended by students who have had little training in mathematics and yet the aim is to also serve those who have had considerable mathematical study.

Science News Letter, June 23, 1934

Sociology

WOMEN WHO WORK—Grace Hutchins—*International Publishers,* 285 p., $2. One of the books on American Labor published by the Labor Research Association.

Science News Letter, June 23, 1934

Physics

THE STORY OF SKYSCRAPERS—Alfred Morgan—*Farrar & Rinehart,* 21 p., $2. The story of how skyscrapers are made and of man's ability to fashion concrete and steel into "cities stood on end." In non-technical style the author (an experienced engineer) goes through the history of a skyscraper from its foundations beneath the bottom-most subcellar to the final nailing of the steelworker's flag on top. The journey skyward is a leisurely, detailed one with side trips into the origin and fabrication of the products of the major industries (there are 1,500 in all) that make a modern skyscraper possible. The final 64 pages consist of full-page views of skyscraper construction. Commendable woodcut-like drawings by the author supplement the many photographs. The book recommends itself as one for older children at the intelligently inquisitive age.

Science News Letter, June 23, 1934

Radio

BROADCASTING ABROAD—Compiled by Union Internationale de Radio-diffusion, A. R. Barrows, Secretary General—*University of Chicago Press,* 104 p., 50c.

Science News Letter, June 23, 1934

Education-Sociology

READINGS IN EDUCATIONAL SOCIOLOGY—Edited by E. George Payne—*Prentice-Hall,* 793 p., $3. The second volume of a work consisting of selections from the writings of many leaders in education.

Science News Letter, June 23, 1934

Psychology—Industry

THE SCIENCE OF WORK—Morris S. Viteles—*W. W. Norton,* 442 p., $3.75. In language relatively simple and free from technical and statistical terminology, it is explained how psychology is applied in making work a happier and more productive activity. Dr. Viteles is an authority on how to make men and machines get along well together. Psychology as well as mechanics and economics must be used if the machines that play such a vital part in our civilization are to run smoothly.

Science News Letter, June 23, 1934

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